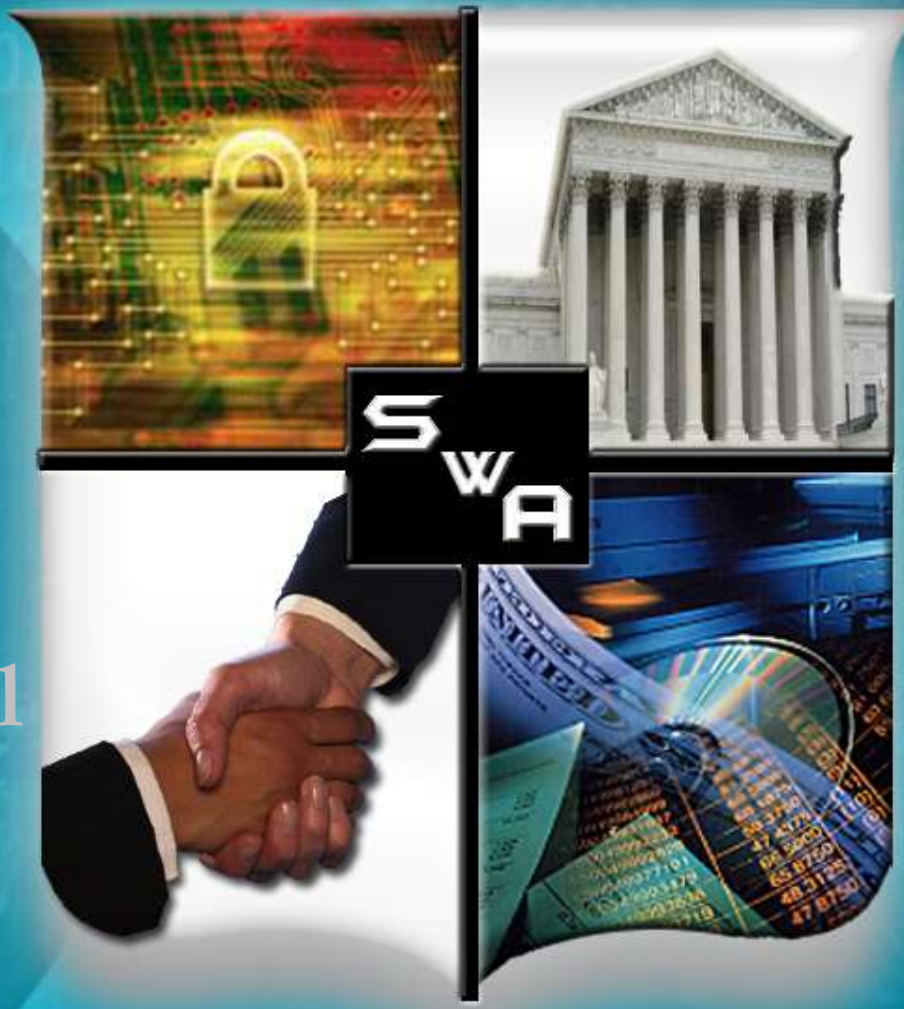
SOFTWARE ASSURANCE FORUM

BUILDING SECURITY IN

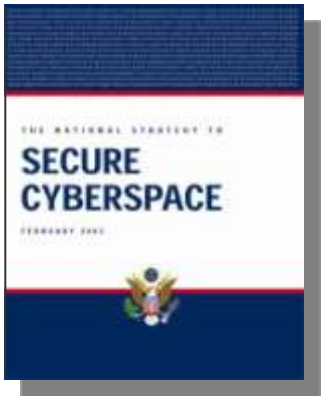
Homeland Security

Commerce

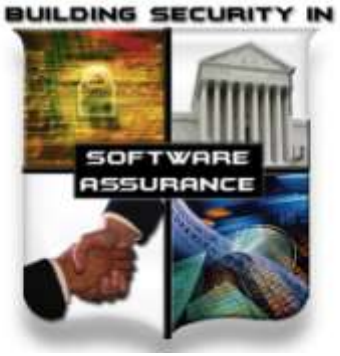
National Defense



Next SwA Forum 27 Sep – 1 Oct 2010 at NIST, Gaithersburg, MD



Software Assurance



Public/Private Collaboration Efforts for Enterprise Security Automation

Sept 27, 2010

Joe Jarzombek, PMP, CSSLP
Director for Software Assurance
National Cyber Security Division
Office of the Assistant Secretary for
Cybersecurity and Communications

Homeland Security

Software Assurance (SwA) – Security Automation

10:45am - SwA Panel: Use Cases, Standards and Roadmap for Enterprise Security Automation

11:45am - Knowing Your Weaknesses (CWE)

1:30pm - Ranking Your Weaknesses (CWSS)

2:30pm - Understanding How They Attack Your Weaknesses (CAPEC)

3:45pm - Sharing Understanding of Malware (MAEC)

4:45pm - Panel on SwA Automation Protocol

Software Assurance (SwA) – Security Automation

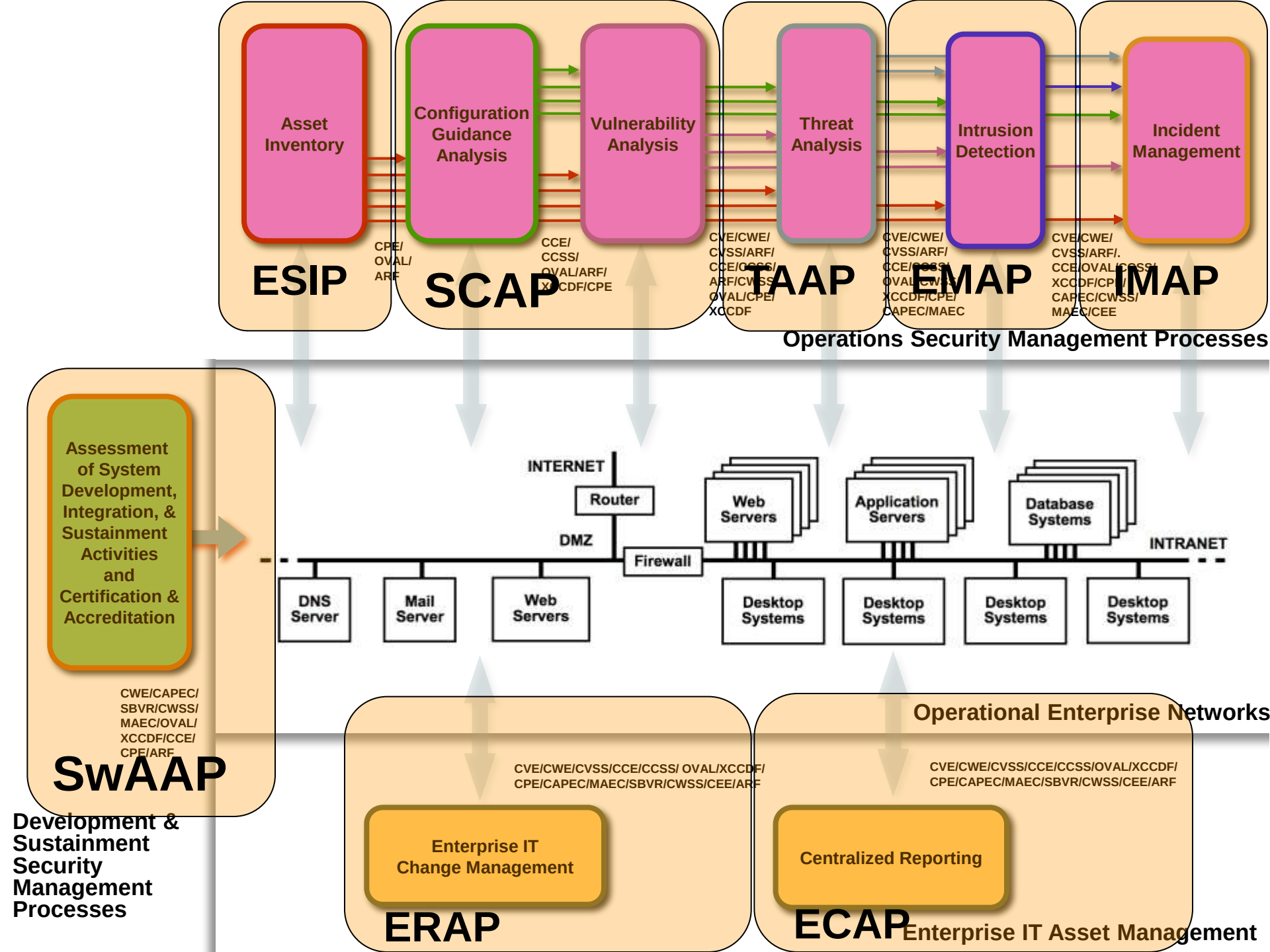
SwA Panel: Use Cases, Standards and Roadmap for Enterprise Security Automation

- Panel Facilitator – Joe Jarzombek, DHS NCSD
- Relevant International Standards – Don Davidson, DoD
- Enterprise Security Automation – Bob Martin, MITRE
- Incident Tracking, Event Management and Threat Analysis: Operational Applications for Automation Protocols – Tom Millar, US-CERT
- Use Cases for Security Automation – Dan Schmidt, NSA and Tim Grance, NIST

Software Assurance (SwA) – Security Automation

- Security Content Automation Protocol (SCAP)
- Software Assurance Automation Protocol (SwAAP)
- Enterprise System Information Protocol (ESIP)
- Enterprise Remediation Automation Protocol (ERAP)
- Enterprise Compliance Automation Protocol (ECAP)
- Event Management Automation Protocol (EMAP)
- Incident Tracking and Assessment Protocol (ITAP)
- Threat Analysis Automation Protocol (TAAP)

Use Cases for Enterprise IT Security


Asset Inventory
Configuration Guidance Analysis
Vulnerability Analysis
Threat Analysis
Intrusion Detection
Incident Management
CPE/ OVAL/ ARF
CCE/ CCSS/ OVAL/ARF/ XCCDF/CPE
CVE/CWE/ CVSS/ARF/ CCE/CCSS/ ARF/CWSS/ OVAL/CPE/ XCCDF
CVE/CWE/ CVSS/ARF/ CCE/CCSS/ OVAL/CWSS/ XCCDF/CPE/ CAPEC/MAEC
CVE/CWE/ CVSS/ARF/. CCE/OVAL/CCSS/ XCCDF/CPE/ CAPEC/CWSS/ MAEC/CEE
ESIP
SCAP
TAAP
EMAP
IMAP
Operations Security Management Processes
Assessment of System Development, Integration, & Sustainment Activities and Certification & Accreditation
CWE/CAPEC/ SBVR/CWSS/ MAEC/OVAL/ XCCDF/CCE/ CPE/ARF
SwAAP
INTERNET
Router
DMZ
Firewall
Web Servers
Application Servers
Database Systems
INTRANET
DNS Server
Mail Server
Web Servers
Desktop Systems
Desktop Systems
Desktop Systems
Desktop Systems
Operational Enterprise Networks
CVE/CWE/CVSS/CCE/CCSS/ OVAL/XCCDF/ CPE/CAPEC/MAEC/SBVR/CWSS/CEE/ARF
CVE/CWE/CVSS/CCE/CCSS/OVAL/XCCDF/ CPE/CAPEC/MAEC/SBVR/CWSS/CEE/ARF
Development & Sustainment Security Management Processes
Enterprise IT Change Management
ERAP
Centralized Reporting
ECAP
Enterprise IT Asset Management

	SCAP	SwAAP	ESIP	ERAP	ECAP	EMAP	ITAP	TAAP
CVE	X						X	X
OVAL	X						X	X
XCCDF	X							
CVRF								
OCIL	X						X	
CPE	X		X				X	X
CCE	X							X
CWE		X						X
CAPEC		X				X	X	X
MAEC		X				X	X	X

	SCAP	SwA AP	ESIP	ERAP	ECAP	EMAP	ITAP	TAAP
CEE						X	X	
CRE				X				
ERI				X				
ARF					X			
OCRL					X			
IODEF							X	
NIEM							X	
CYBEX							X	

Software Assurance (SwA) – Security Automation

Panel on Software Assurance Automation Protocol

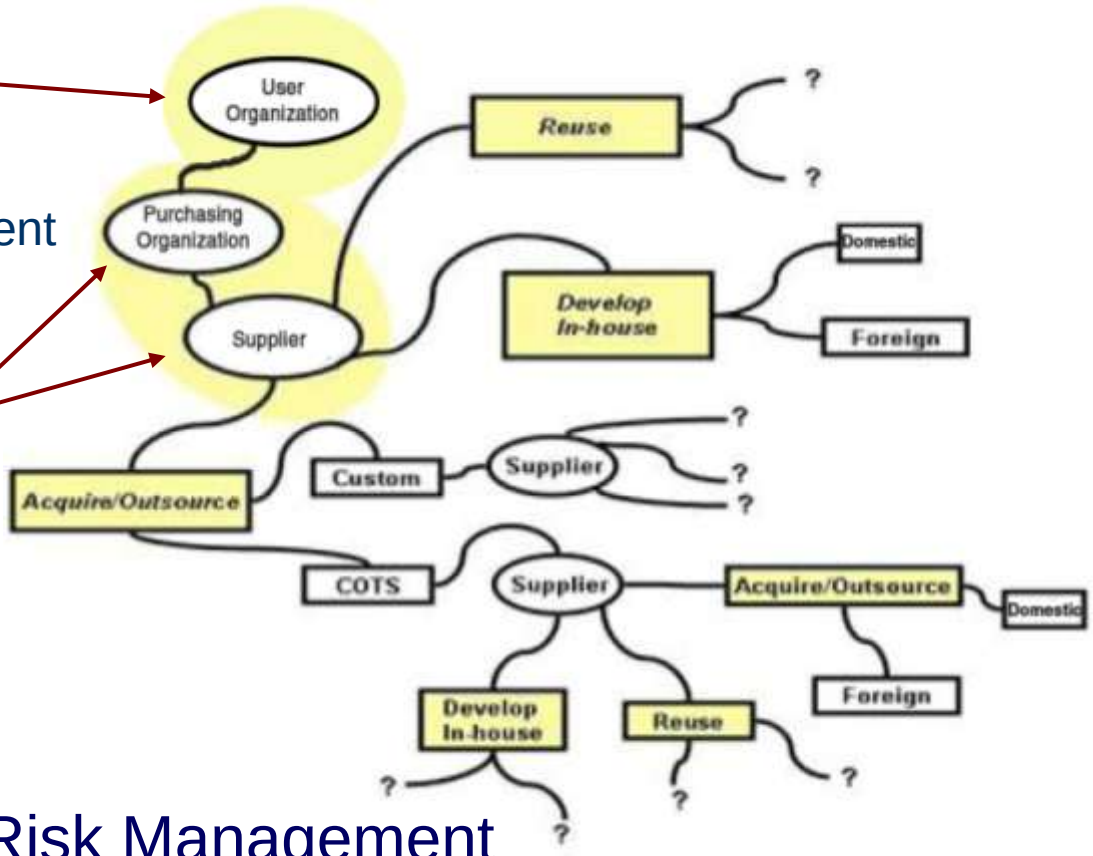
Facilitator: Joe Jarzombek, DHS NCSD

Steve Quinn, NIST

Dan Schmidt, NSA

Risk Management (Enterprise <=> Project):
Shared Processes & Practices // Different Focuses

- Enterprise-Level:
  - Regulatory compliance
  - Changing threat environment
  - Business Case
- Program/Project-Level:
  - Cost
  - Schedule
  - Performance



Software Supply Chain Risk Management traverses enterprise and program/project interests

Homeland Security

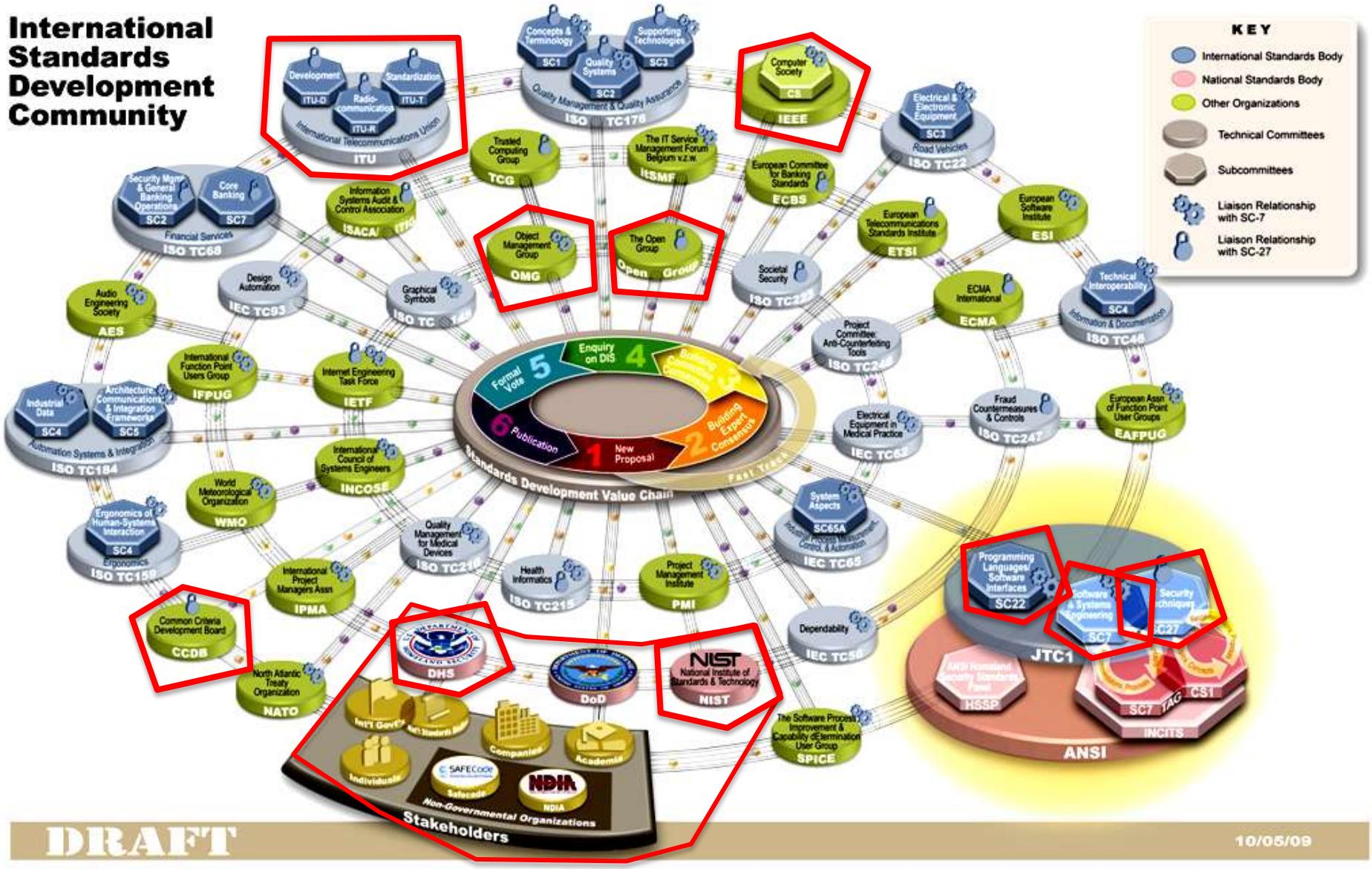
Software Assurance "End State" Objectives…

- **Government, in collaboration with industry / academia, raised expectations for product assurance with requisite levels of integrity and security:**
  - Helped advance more comprehensive software assurance diagnostic capabilities to mitigate risks stemming from exploitable vulnerabilities and weaknesses;
  - Collaboratively advanced use of software security measurement & benchmarking schemes
  - Promoted use of methodologies and tools that enabled security to be part of normal business.
- **Acquisition managers & users factored risks posed by the software supply chain as part of the trade-space in risk mitigation efforts:**
  - Information on suppliers' process capabilities (business practices) would be used to determine security risks posed by the suppliers' products and services to the acquisition project and to the operations enabled by the software.
  - Information about evaluated products would be available, along with responsive provisions for discovering exploitable vulnerabilities, and products would be securely configured in use.
- **Suppliers delivered quality products with requisite integrity and made assurance claims about the IT/software safety, security and dependability:**
  - Relevant standards would be used from which to base business practices & make claims;
  - Qualified tools used in software lifecycle enabled developers/testers to mitigate security risks;
  - Standards and qualified tools would be used to certify software by independent third parties;
  - IT/software workforce had requisite knowledge/skills for developing secure, quality products.

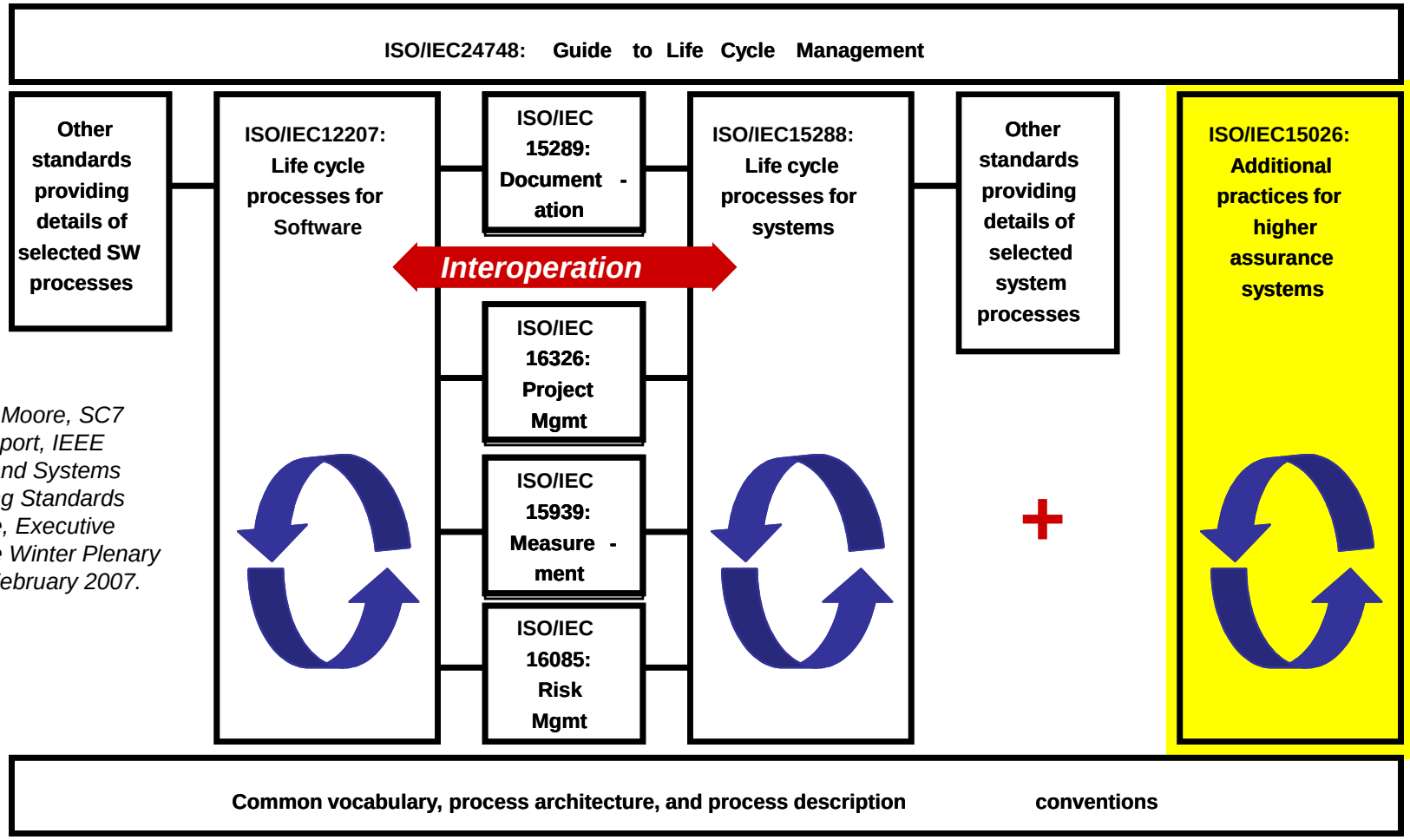
Need for Rating Schemes

- Rating of Software products:
  - Supported by automation
  - Standards-based
  - Rules for aggregation and scaling
  - Verifiable by independent third parties
  - Labeling to support various needs (eg., security, dependability, etc)
  - Meaningful and economical for consumers and suppliers
- Rating of Suppliers providing software products and services
  - Standards-based or model-based frameworks to support process improvement and enable benchmarking of organizational capabilities
  - Credential programs for professionals involved in software lifecycle activities and decisions

We are engaged with many parts of the Community for Software Assurance-related standardization



ISO/IEC/IEEE 15026, System and Software Assurance



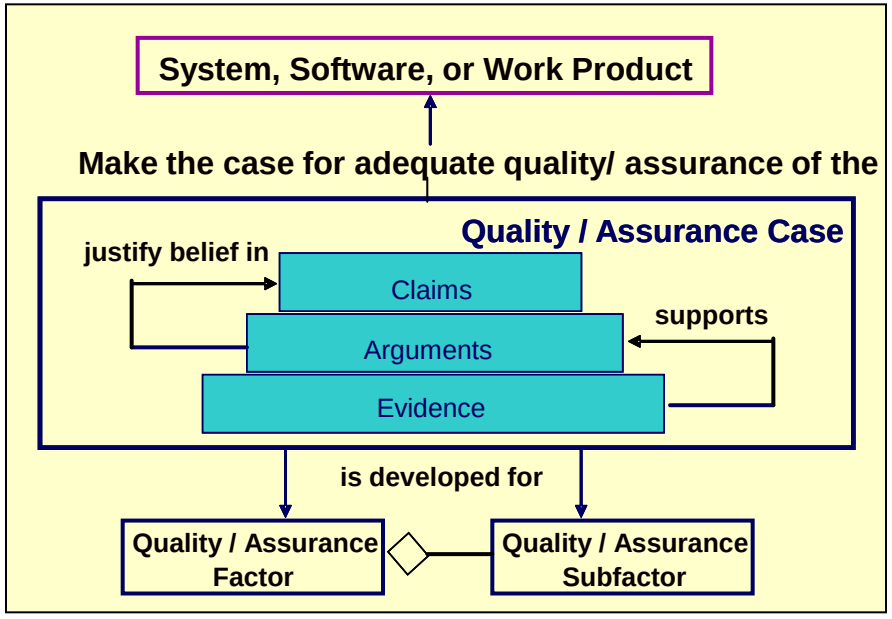
Source: J. Moore, SC7 Liaison Report, IEEE Software and Systems Engineering Standards Committee, Executive Committee Winter Plenary Meeting, February 2007.

"System and software assurance focuses on the management of risk and assurance of safety, security, and dependability within the context of system and software life cycle

Terms of Reference changed: ISO/IEC JTC1/SC7 WG7, previously "System and Software Integrity" SC7 WG9

ISO/IEC/IEEE 15026 Assurance Case

- **Set of structured assurance claims, supported by evidence and reasoning (arguments), that demonstrates how assurance needs have been satisfied.**
  - Shows compliance with assurance objectives
  - Provides an argument for the safety and security of the product or service.
  - Built, collected, and maintained throughout the life cycle
  - Derived from multiple sources



- **Sub-parts**
  - A high level summary
  - Justification that product or service is acceptably safe, secure, or dependable
  - Rationale for claiming a specified level of safety and security
  - Conformance with relevant standards & regulatory requirements
  - The configuration baseline
  - Identified hazards and threats and residual risk of each hazard / threat
  - Operational & support assumptions

Attributes

- Clear
- Consistent
- Complete
- Comprehensible
- Defensible
- Bounded
- Addresses all life cycle stages

Software Assurance Ecosystem: The Formal Framework

The value of formalization extends beyond software systems to include related software system process, people and documentation

Process Docs & Artifacts

Requirements/Design Docs & Artifacts

Reports
Risk Analysis, etc)

Process, People & Documentation Evaluation Environment

- Some point tools to assist evaluators but mainly manual work
- Claims in Formal SBVR vocabulary
- Evidence in Formal SBVR vocabulary
- Large scope requires large effort

Process, People, documentation Evidence

Formalized Specifications

Claims, Arguments and Evidence Repository

- Formalized in SBVR vocabulary
- Automated verification of claims against evidence
- Highly automated and sophisticated risk assessments using transitive inter-evidence point relationships

Software System / Architecture Evaluation

- Many integrated & highly automated tools to assist evaluators
- Claims and Evidence in Formal vocabulary
- Combination of tools and ISO/OMG standards
- Standardized SW System Representation In KDM
- Large scope capable (system of systems)
- Iterative extraction and analysis for rules

Software system Technical Evidence

Executable Specifications

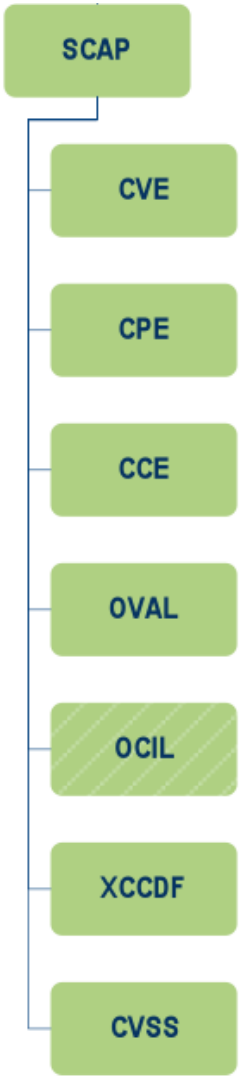
Software System Artifacts

Hardware Environment

Protection Profiles

IA Controls

CWE



SCAP 1.1 uses the following specifications:

- Extensible Configuration Checklist Description Format (XCCDF) 1.1.4, a language for authoring security checklists/benchmarks and for reporting results of checklist evaluation [QUI08]
- Open Vulnerability and Assessment Language (OVAL) 5.6, a language for representing system configuration information, assessing machine state, and reporting assessment results
- Open Checklist Interactive Language (OCIL) 2.0, a language for representing security checks that requires human feedback
- Common Platform Enumeration (CPE) 2.2, a nomenclature and dictionary of hardware, operating systems, and applications [BUT09]
- Common Configuration Enumeration (CCE) 5, a nomenclature and
  configurations
- Common Vulnerabilities and Exposures (CVE), a nomenclature an
  software flaws[9]
- Common Vulnerability Scoring System (CVSS) 2.0, an open speci
  severity of software flaw vulnerabilities [MEL07].


NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-126 Revision 1 (DRAFT)

The Technical Specification for the Security Content Automation Protocol (SCAP): SCAP Version 1.1 (DRAFT)

Recommendations of the National Institute of Standards and Technology

Stephen Quinn
David Waltermire
Christopher Johnson
Karen Scarfone
John Banghart

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-126 Revision 1 (DRAFT)

The Technical Specification for the Security Content Automation Protocol (SCAP): SCAP Version 1.1 (DRAFT)

Recommendations of the National Institute of Standards and Technology

Stephen Quinn
David Waltermire
Christopher Johnson
Karen Scarfone
John Banghart

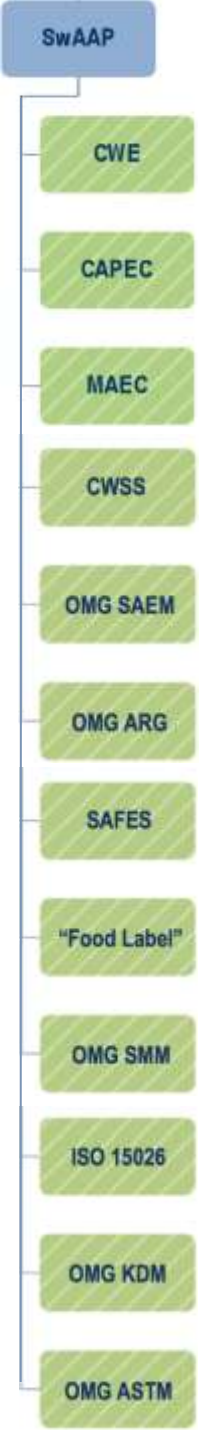
NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-126 Revision 1 (DRAFT)

The Technical Specification for the Security Content Automation Protocol (SCAP): SCAP Version 1.1 (DRAFT)

Recommendations of the National Institute of Standards and Technology

Stephen Quinn
David Waltermire
Christopher Johnson
Karen Scarfone
John Banghart



Software Assurance Automation Protocol (SwAAP)

- For measuring & enumerating software weaknesses and the assurance cases.

Common Weakness Enumeration (CWE),

Common Attack Pattern Enumeration & Classification (CAPEC),

Malware Attribute Enumeration & Characterization (MAEC),

Common Weakness Scoring System (CWSS),

Software Assurance Findings Expression Schema (SAFES),

NIST SAMATE's "Software Transparency Label",

ISO/IEC 15026 "Assurance Case" (ISO 15026),

OMG Software Assurance Evidence Metamodel (OMG SAEM),

OMG Argumentation Metamodel (OMG ARG),

OMG Structured Metrics Metamodel (OMG SMM),

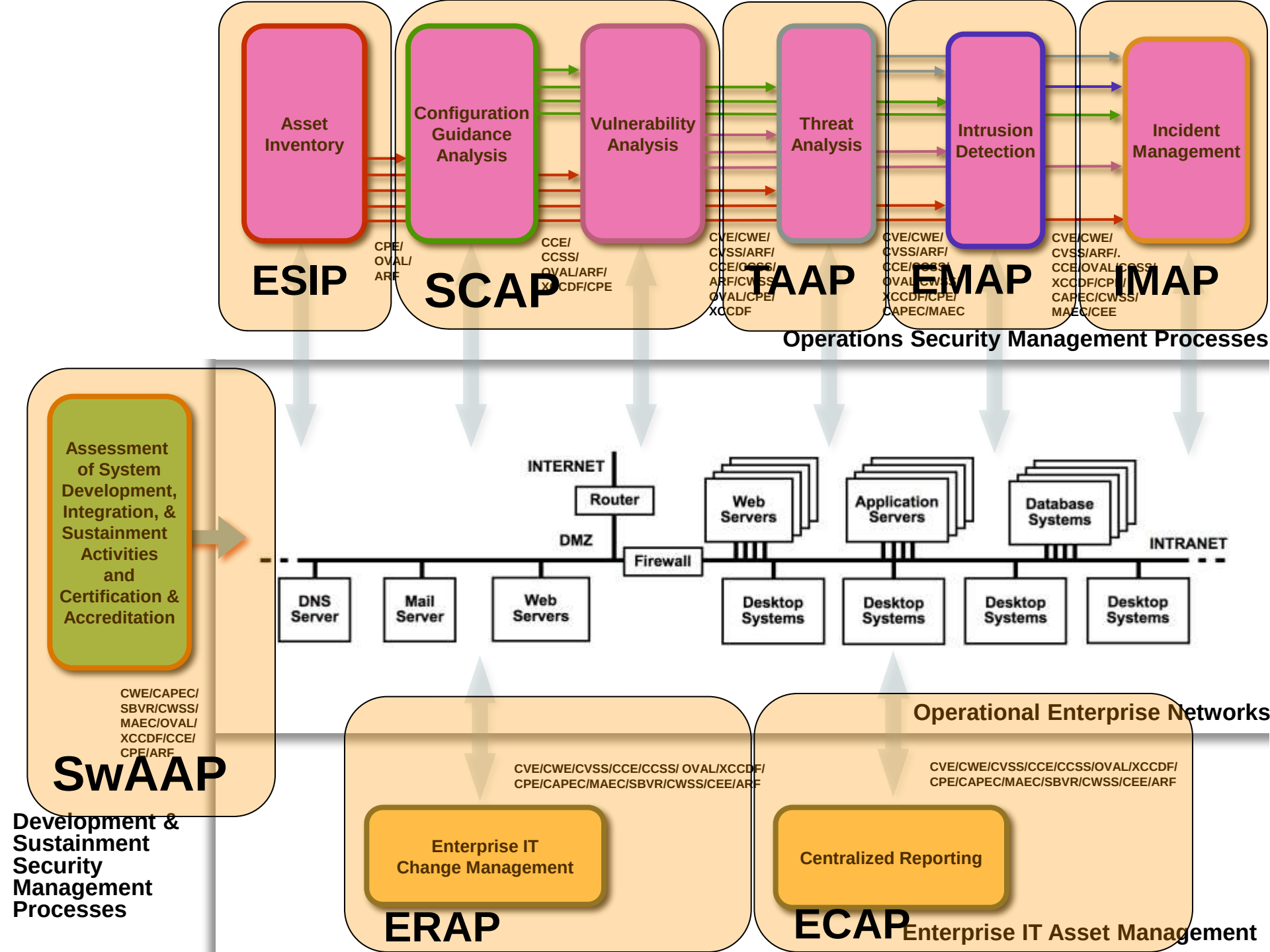
OMG Knowledge Discovery Metamodel (OMG KDM),

OMG Abstract Syntax Tree Metamodel (OMG ASTM)

- plus SCAP to capture "accredited" system CPEs and CCE settings?
- OVAL checks for capturing "finger print" of software applications to address supply-chain risk measurement?

“Other” Automation Protocols (“O”AP)

- Event Management Automation Protocol (EMAP)
  - For reporting of security events.
  - Uses Common Event Expression (CEE), Malware Attribute Enumeration & Characterization (MAEC), CAPEC, etc.
- Enterprise Remediation Automation Protocol (ERAP)
  - For automated remediation of mis-configuration & missing patches.
  - Uses Common Remediation Enumeration (CRE) and Extended Remediation Information (ERI).
- Enterprise Compliance Automation Protocol (ECAP)
  - For reporting configuration compliance.
  - Uses Asset Reporting Format (ARF), Open Checklist Reporting Language (OCRL), etc.
- Enterprise System Information Protocol (ESIP)
  - For reporting of asset inventory information.
  - Uses …..
- Threat Analysis Automation Protocol (TAAP)
  - For analyzing threats and security risks.
  - Uses….
- Incident Management Automation Protocol (IMAP)
  - For supporting incident management and response.
  - Uses IODEF, etc


Asset Inventory
Configuration Guidance Analysis
Vulnerability Analysis
Threat Analysis
Intrusion Detection
Incident Management
CPE/ OVAL/ ARF
CCE/ CCSS/ OVAL/ARF/ XCCDF/CPE
CVE/CWE/ CVSS/ARF/ CCE/CCSS/ ARF/CWSS/ OVAL/CPE/ XCCDF
CVE/CWE/ CVSS/ARF/ CCE/CCSS/ OVAL/CWSS/ XCCDF/CPE/ CAPEC/MAEC
CVE/CWE/ CVSS/ARF/. CCE/OVAL/CCSS/ XCCDF/CPE/ CAPEC/CWSS/ MAEC/CEE
ESIP
SCAP
TAAP
EMAP
IMAP
Operations Security Management Processes
Assessment of System Development, Integration, & Sustainment Activities and Certification & Accreditation
CWE/CAPEC/ SBVR/CWSS/ MAEC/OVAL/ XCCDF/CCE/ CPE/ARF
SwAAP
INTERNET
Router
DMZ
Firewall
Web Servers
Application Servers
Database Systems
INTRANET
DNS Server
Mail Server
Web Servers
Desktop Systems
Desktop Systems
Desktop Systems
Desktop Systems
Operational Enterprise Networks
CVE/CWE/CVSS/CCE/CCSS/ OVAL/XCCDF/ CPE/CAPEC/MAEC/SBVR/CWSS/CEE/ARF
CVE/CWE/CVSS/CCE/CCSS/OVAL/XCCDF/ CPE/CAPEC/MAEC/SBVR/CWSS/CEE/ARF
Development & Sustainment Security Management Processes
Enterprise IT Change Management
ERAP
Centralized Reporting
ECAP
Enterprise IT Asset Management

Next SwA Forum 27 Sep – 1 Oct 2010 at NIST, Gaithersburg, MD

SOFTWARE ASSURANCE FORUM

"Building Security In"

https://buildsecurityin.us-cert.gov/swa

Joe Jarzombek, PMP, CSSLP
Director for Software Assurance
National Cyber Security Division
Department of Homeland Security
Joe.Jarzombek@dhs.gov
(703) 235-5126
LinkedIn SwA Mega-Community

Homeland Security

SOFTWARE ASSURANCE FORUM

BUILDING SECURITY IN

Homeland Security

Commerce

National Defense

Next SwA Forum 27 Sep – 1 Oct 2010 at NIST, Gaithersburg, MD